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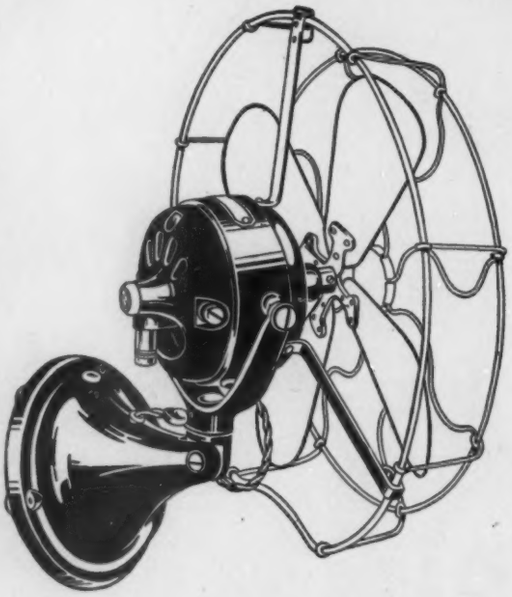

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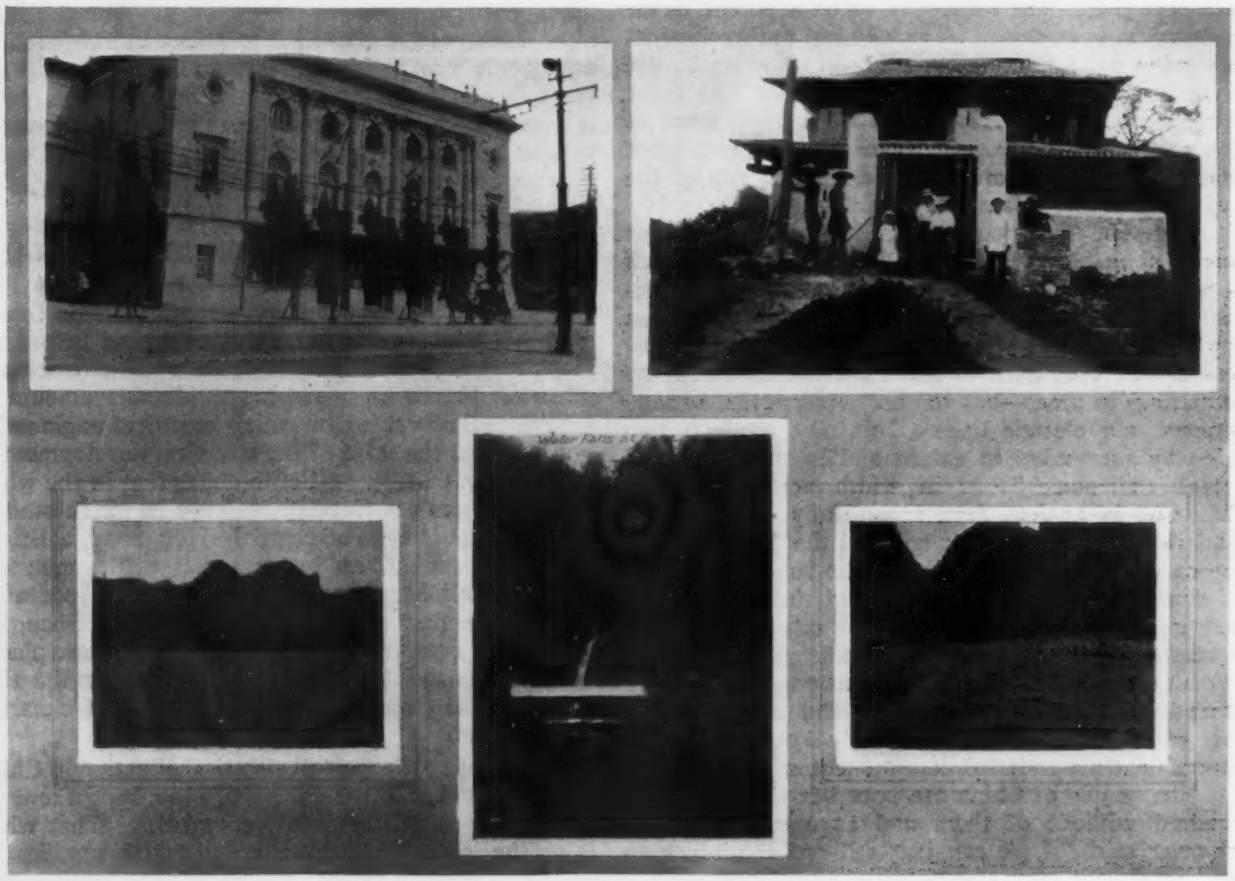
THE ELECTRICAL OUTLOOK IN THE ORIENT

BY ROBERT SIBLEY.

Any one, or all, of three things tend to make possible the generation of cheap electrical energy. There must be abundance of easily developed water powers, vast coal fields, or a reasonably assured supply of cheap crude petroleum.

Many are prone to see ahead in the immediate future a gigantic readjustment of the world's industries, manufactures and trade relations. This is fundamentally due to two causes, the present European death grapple in the nature of a devastating international war and secondly the unprecedented commercial readjustments due to the opening of the Panama Canal. The Orient and South America seem to present the most alluring field for new opportunities and new developments. The former is a country already overpopulated, while the latter is perhaps the last "new West."

When the commercial possibilities of the Orient are taken advantage of it is easily to be seen that electrical development on a large scale must immediately follow. Indeed it must in many cases even precede such a commercial era. It is profitablle and instructive, then, to get a preliminary scanning of some of the natural resources of the Asiatic coast.



Overhead Trolley and Roadbed Construction in Tokyo — Gateway in City Wall of Canton.

The Pyramids of Ichang, China. — Water Falls at Kobe, Japan. — Qui River Gorge, Northern China.

Oil has recently been discovered at Akita, on the northwestern coast of the Island of Hondo, the principal island of the Japanese Kingdom. A gusher producing 200,000 gals. of oil per day and owned by the Nippon Sekiyu Kaisha closed the stock exchange in Tokyo by producing such excitement during the past year among Japanese speculators and capitalists. Should oil in great quantities become one of the producing resources of Japan, undoubtedly a great impetus will be given to electrical development throughout the island kingdom.

Coal is now developed in large quantities in Japan. The market price of five to six dollars per ton is not, however, conducive to its extensive use in electrical development.

The natural water powers of Japan due to the limited area from which they draw their source of supply are usually of comparatively low head—say from 50 to 100 ft.—and as a rule are infrequent in number. Indeed it might be said today that so far as possible future development of electrical energy from water power is concerned, the zenith in such development has already been reached in the island kingdom.

It is reasonably safe to say, however, that the possible development of a cheaper coal supply and the bright outlook from her oil fields combined with a ceaseless activity and yearning on the part of her industrial captains will never see Japan behind the times in electrical development.

Electrical Possibilities in China.

On the mainland of the Asiatic Coast cheap coal as a fuel is destined some day to be a potent factor in electrical generation. A rich bed of anthracite coal two miles by four miles is said, on good authority, to be located on the North River about 150 miles above Canton, while in northern China vast areas of rich coal fields are known to exist. At the present time, however, the natives will not allow any of the coal to be deported from their local districts.

Electrical development in China at the present time is of very limited degree. In the coast cities such as Shanghai, Hong Kong, Tien-Sien and others, electric car lines have proven quite profitable. The great city of Canton, with something like over a million people—no one ever tried to count the hordes except by estimating in areas—has neither waterworks, sewage systems, nor electric lines. This city is about two miles by four miles in extent and is surrounded by a high wall some 30 ft. in width across the top. This wall in ancient days successfully defended the inhabitants from the onslaughts of the Tartars. European and American engineers who have seen it and its strategic relation to the heart of the city, declare that an electric line encircling the city with spokes or cross lines threading through its heart would prove a great success. Many other similar opportunities are offered in China to the capitalist, and when reasonably secure investment is assured by a strong national government a wonderful development will take place.

The people of China are poor but there are four hundred millions of them and as one enterprising importer said, "if we can just sell one tooth-pick to each inhabitant, we've done some day's business."

Hydroelectric possibilities in China are vast. Due to the immense low-lying areas drained by the great water courses of this country, the natural water powers are located as a rule hundreds of miles up in the interior. This is seen to be true from the fact that the great Yang-tsi River is navigable by gunboats for 2000 miles up stream.

Undoubtedly some day a hydroelectric system surpassing the damming of the Mississippi River at Keokuk, Iowa, will be undertaken in the Yang-tsi gorges at Ichang. These gorges are about 650 miles inland from Shanghai, and about 450 miles from Peking. The nature of the embankments and the precipitous rapids encountered for 15 to 20 miles are shown in the illustration. Although gunboats may travel over these rapids it is very dangerous to do so. The whole flow of this, one of the world's greatest rivers, passes through the narrow defiles as shown.

While en route homeward bound from China, I had a most interesting talk with a British army officer who had made the trip inland from India over the great Himalaya mountains and down through the fertile valleys and precipitous gorges of the upper Yang-tsi drainage area. From his descriptions of the bountiful supply with which nature has endowed inland China with possible water powers from this, the world's greatest and tallest mountain ranges, it would seem that China with its cheap labor and power possibilities is truly destined to some day play a most important role in the world's industrial and manufacturing achievements.

Of all the countries of the Far East, China certainly presents the most brilliant outlook for engineering and commercial development. For the good of all concerned, the open door policy unhampered by any single predominating foreign influence will aid most in quickly bringing results in happiness, peace and prosperity to its now starving and overcrowded population and at the same time this policy will prove a sound and profitable investment to outside capital.

ELECTRICAL ENGINEERING IN CHINA.

BY CONSUL GENERAL GEORGE E. ANDERSON.

A paper prepared by Professor Middleton Smith, of the University of Hongkong, and read before the Hongkong section of the Institution of Electrical Engineers on March 23, gives a considerable amount of information of value concerning electrical engineering in China and the state of the electrical development of the country. Professor Smith states that in the whole of China there are three places only in which modern industrialism is even attempted—Hongkong, a British colony; Shanghai, an international settlement; and Hankow, another international settlement operating under somewhat different conditions from Shanghai. The writer considers the developments in these places, however, as satisfactory object lessons, for the time being, to the Chinese of the advantages of electrical development.

Reviewing the general electrical situation in China, it is stated that in the colony of Hongkong there are two public electricity supply companies. That which is on the island of Hongkong and which supplies the principal portion of the colony, has a station with 2000 kw. Diesel engines and 600 kw. steam engines, the understanding being, however, that the owners are

planning a new steam turbine driven station. The other public company is on the mainland portion of the colony. Its station embraces 516 kw. engines, but 1500 kw. is to be installed the current year. The local tramway is served by its own power station. The Taikoo dock yard is served by its own plant, which embraces a total capacity of 2250 kw.

The Hongkong & Whampao Dock Company has a plant with a capacity of 500 kw., but it is preparing to abandon it and take current from one of the public supply companies. This company has on order and will this year install two 6-phase rotary converters (60 cycle) of 350 kw. capacity each. There are perhaps half a dozen other small generating plants in the colony, mostly driven by gas engines.

In Canton the public supply company uses steam and Diesel engines to the total capacity of 1540 kw.

In the opinion of Professor Smith the electrical installation in Shanghai, which is owned by the municipality, dominates the entire electrical situation in the Yangtze Valley. The present capacity of the plant is 14,000 kw., i. e., two steam-driven 5000 kw. and one 4000 kw. turbines. The plant has all the latest coal-handling and similar appliances and is considered the model plant of the Far East. Extensions up to an additional capacity of 20,000 kw. are planned.

In the course of the paper the writer presented the following information collected as to the business done in China by British and other concerns in recent years. The information is given as not being complete, but as indicating development:

Messrs. Belliss & Morcom (Ltd.) have installed 102 steam engines in China, with a total horsepower of 28,960 b.h.p. Most of these are used for electricity supply. This firm publishes an interesting map of China, showing about 40 places in the country where these engines are to be seen. None of the engines seem to be larger than 500 b.h.p., and the average size is 284 b.h.p.

The General Electric Company of China (Ltd.) installed at Soochow, in Kiangsu Province, a 1,375 kw. 3-phase alternator, direct coupled to a high-speed steam engine, complete with high-tension switchboard, etc. The above British-made plant was supplied as an extension to the original, which was of German origin. In Chang Chow, in Kiangsu Province, there is one 150 kw. 3-phase alternator, direct coupled to high-speed steam engine, complete with water-tube boilers, high-tension switchboard, transformers, etc. In Tientsin there are two d.c generators of 75 kw., coupled to high-speed steam engines, supplied for lighting of the Japanese settlement. Further contracts recently secured are for lighting of two other large Chinese cities; the electrical plant consists of one 200 kw. 3-phase alternator, one 150 kw. 3-phase alternator. A large number of single and 3-phase motors, from 5 up to 100 h.p., have also been supplied for use in cotton mills and other factories. Amongst other installations are the equipment of several river and coasting steamers with electric light plants, consisting of direct current generators of about 20 kw. capacity, direct coupled to high-speed vertical steam engines. This firm says that an outlet for electrical plant is comprised in upcountry hospitals, missions, and private Chinese residences, where small dynamos driven by oil engines are very much in favor. In South China they have supplied a plant to Fatshan, Kwangtung Province; there are three 60 kw. 3-phase alternators, with direct coupled exciters, belt driven by three 90 h.p. crude oil engines, and a high-tension marble switchboard, consisting of 14 panels. In Shek Ki there are two 30 kw. 200-volt d.c. generators, driven by suction gas engines complete with switchboard.

Messrs. W. C. Jack (Ltd.) state that they have supplied various electric lighting installations in South China, as follows: For the Canton Government (1909), one 60 kw. 250-volt d.c. dynamo, belt driven by a 125 b.h.p. twin cylinders, horizontal gas engine, with suction gas plant. At Shek Ki Heungshan (1912), one 30 kw. 220-volt d.c. dynamo, belt driven by a 66 b.h.p. suction gas engine and plant. At Cheung Chow (1912), one 8 kw. 220-volt d.c. dynamo, belt driven by a 14 b.h.p. suction gas engine and plant. At Kongmoon, Kwangtung (1913), one 40 kw. 2000-volt, 60-cycle single-phase alternator, belt driven by a b.h.p. gas engine and plant. At Hoihow, Hainan (1913), one 21 kw. 220-volt d.c. dynamo, belt driven by a 45 b.h.p. horizontal crude oil engine. The firm also has installed a large number of small private plants, consisting of horizontal and vertical kerosene oil engines, belt driven and direct coupled to 100-volt d.c. dynamos, ranging from 1 kw. to 10 kw., also one 12 kw. 100-volt d.c. set, direct coupled to a vertical semi-Diesel engine, at Tung Shan, Canton.

Messrs. Siemssen's China Company have supplied the following more important plants in the south, viz.: One 140 kw. Diesel s.p. 2200-volt alternator for the Canton Electric Supply Company. They have also recently received an order for a 750 kw. Diesel alternator from the same company. They have supplied the Macao Electric Light Company, Macao, with four Diesel driven alternators, 3000 volts, 3-phase, 200 kw. each. They have supplied in Yunnanfu two water turbine sets, each of 300 kw. capacity; pressures 3000 volts, stepped up to 23,000 volts; length of transmission line, 25 miles. The current is stepped down to 2000 volts by the time it reaches Yunnanfu. This plant is probably the most interesting one in China. Besides the above this firm has supplied plants in Peking, Changsha, the Nanyang Iron Works, Tsingtau, Pingshing Colleries, and so on; all these plants are large turbo alternators, some of 1000 kw. and others much larger.

Cost of Current in China.

Discussing the cost of current in China and prices at which it can be profitably sold in most Chinese cities, the paper says:

In the case of the new installations the general practice at present seems to show that the Chinese commence on a scale of rather under 100 kw. There is probably not very much difference in the cost of running crude oil engines and suction gas plants of this size.

Take a small installation of 50 kw. (oil engines). The capital cost of the engines, foundations, dynamos and switchboard would be (roughly) $13,000 ($5720 gold). A rough building and land would probably bring it up to $15,000 ($6600 gold).

We find at the university that crude oil can be used as fuel to cost less than 2½ cents per unit; lubricating oil and waste, etc., say one-half cent per unit. Wages for supervision, drivers, etc., $200 ($88 gold) a month, say $2400 ($1056 gold) per annum.

The output of the station is reckoned at 50,000 units per annum. Cost of depreciation per annum is 10 per cent, say $1500 ($660 gold). The total cost, deprecitaion, wages, etc., is, say $4000 ($1760 gold) per annum, or 8 cents per unit. The running expenses are 3 cents a unit. Hence the total generating costs are about 11 cents per unit. As overhead mains may be used, the distribution costs are low.

Experience has shown that Chinese will pay 25 cents a unit, and there is clearly a good margin of profit.

If water power is used, it is probable that, even with long transmission wires, a company would make big profits if it sold energy at 8 cents a unit.

The cents noted are in Hongkong currency, 100 of which are equal at present to about $0.44 American currency.

The paper concludes that while present development is discouraging, the future has much to offer foreign manufacturers. It states:

After two years of study of the subject the writer has the impression that at present the demand for electrical apparatus in China is all on a comparatively small scale. Shanghai is the one great exception. Commercial men in Britain might possibly be pessimistic about the outlook as they read these figures, but there are two or three factors to be remembered which may make them take a rather more rosy view of the future prospects in China:

(1) There is a great desire among all classes of the Chinese to have electric light, and experience in and around Hongkong seems to prove that they are quite willing to use and pay for it at even extravagant prices.

(2) The plants already installed are having an educational effect. In nearly all cases extensions are contemplated.

(3) The Chinese are particularly anxious to adopt applied science work. During the last few years the shrewd business men in the coast ports have been repeating vaguely but sincerely, "There is money in it."

(4) The simple statement that of the 167 students in the Hongkong University 92 have selected engineering as a profession shows quite clearly the direction of the thoughts of the more progressive parents.

(5) Twenty-five years ago most of the supply stations in Great Britain were installing units of about the size of those now being used in China.

Up till the present there has been practically nothing in the nature of an educative campaign on behalf of electrical machinery in China.

There are difficulties, financial and administrative, to be overcome before this market is greatly increased, but the greatest difficulty of all is to provide object lessons to the Chinese and to supply information and unbiased advice.

Carbonization of peat has been reported upon by the Swedish experts commissioned to examine Laval's method. Briefly stated, the processes employed in this method are as follows: The peat is diluted with a large quantity of water. The resulting pap is then heated to a temperature of 150 to 250 degrees C. (302 to 482 degrees F). The chemical changes thus produced leave a dry mass of an increased heat value, though reduced in volume, the physical constitution of the material being altered in such a way that water can be removed in a much larger proportion than would have been possible with the original peat. After the water has been partially removed by pressure or suction a product is left containing 50 to 70 per cent of water. By artificial drying peat powder is then easily prepared, to be used in the manufacture of briquettes. With a small apparatus the commission had no difficulty in preparing a product containing only 52 per cent of water. The experts were of the opinion that a small plant manufacturing 10 tons of peat fuel per day would have to reckon with a cost of at least 15 crowns ($4.02) per ton of peat powder containing 10 per cent of water and having an effective heat value of 4800 calories, the cost not including interest or amortization. In their opinion, however, better results might be expected for a larger plant manufacturing at least 50 tons of fuel per day. Here the cost was reckoned at 13 crowns ($3.48) per ton, including interest and amortization.

CORROSION OF METAL FLUME SHEETS.

BY I. C. HARRIS.

(This authoritative opinion regarding rust-resisting qualities of iron and steel, applies to many other lines of work besides the Reclamation Service. The author is engineer in charge of inspection of materials for the U. S. Reclamation Service, from whose "Record" this is taken.—The Editor.)

The life of semicircular metal flumes is determined principally by the rapidity of corrosion of the thin metal sheets. These sheets are subjected in fabrication to severe forming operations, which tend to injure the galvanizing, and the economic value of flumes of this type depends upon the selection of the most suitable base metal, a joint that requires the least deformation of the sheets, and the most durable galvanizing.

The galvanizing on the sheets will prevent corrosion for a certain length of time but not indefinitely. For this reason it is desirable to use a base metal with superior resistance to corrosion if such metal can be obtained at a cost which will justify the expenditure. A base metal that would prove to be of distinct merit in metal flumes would also have a corresponding value for use in culverts, pipe lines, and other structures exposed to severe corrosive influences.

The general subject of corrosion of iron and steel has been given considerable attention by manufacturing interests during the last few yeasr. The manufacturers may be divided into two groups on this question. One claims that the purity of the iron is the principal factor and manufactures so-called "pure irons" under various trade names, while the other claims that the addition of a certain percentage of copper to a selected grade of open-hearth steel produces a steel—commonly called "copper-bearing steel"—of superior quality as regards resistance to corrosion. Each manufacturer has made certain experiments and tests to demonstrate the superiority of his product. The results of these, and other tests have been studied, plants have been visited for the purpose of studying methods and processes of manufacture, and opinions of disinterested experts have been received. Much interesting and valuable information has thus been obtained, but no conclusive evidence has been received which justifies the claim that any one of the special products on the market at the present time has any positive superiority over ordinary commercial grades of iron and steel as regards resistance to corrosion under conditions of use that obtain on our projects.

It is evident, therefore, that the status of our knowledge of the relative rust-resisting qualities of different irons and steels, notwithstanding the numerous tests that have been made, is still very indefinite and unsatisfactory. Further tests are now under way or are being inaugurated under various auspices, and it is probable that the next few years will bring forth more definite data on this subject. In the meantime it appears that there is no justification for the payment of a higher price for one material than for another on the basis of relative non-corrodibility when used under the usual conditions encountered on the projects of the Reclamation Service.

OIL BURNING STAND-BY PLANTS.

BY C. H. DELANEY.

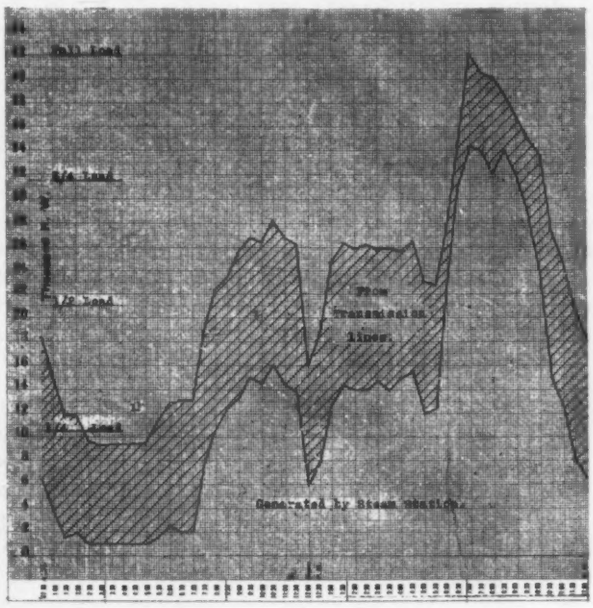
(After describing some unusual operating conditions, the author analyses their effect on the cost. This extract is taken from a paper of the same title presented at the San Francisco convention of the National Electric Light Association, June 7-11, 1915.—The Editor.)

Three Stand-by Steam Stations.

The Pacific Gas & Electric Company is operating three stand-by steam stations at the present time, a 42,000 kw. plant in San Francisco, a 21,000 kw. plant in Oakland and a 5000 kw. plant in Sacramento. All of these are steam turbine plants.

The San Francisco plant operates continuously and is of sufficient size to carry the entire San Francisco load. It is normally operated in parallel with the transmission system and a certain number of boilers are kept standing by ready to pick up the amount of load received in San Francisco from the transmission system.

The method of operation is illustrated by the accompanying load curve showing the conditions as they existed on March 5, 1915. The upper line in this load



Station A, San Francisco. March 5, 1915.

curve shows the total city load supplied to San Francisco; the lower line shows the amount of current generated by the steam station, and the shaded portion between these two lines shows the amount of current received from the transmission system. In case of trouble on the transmission system the entire city load would be immediately thrown on the steam station, which means that during the day the load may jump instantaneously from approximately 14,000 to 26,000 kilowatts, and during the evening peak the load may jump from 34,000 to 42,000 kilowatts. It is, therefore, essential to keep enough boilers with steam up and cut-in on the line, to instantly pick up this additional load. This can be done in two ways; first, by firing only sufficient boilers to carry the actual load on the plant, operating them at a constant capacity, and keeping the remaining boilers hot, with steam up, ready to be fired instantly when the load comes on. Second, the full number of boilers necessary for the city load may be kept under fire continuously, operating at light load, but capable of being forced hard enough to carry the extra load when it comes on the station.

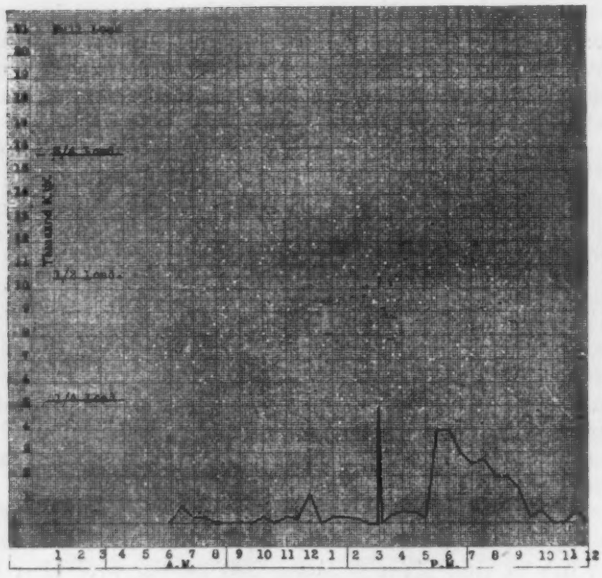
The latter method requires greater care in operation to insure proper regulation of the air supply with the wide variation of load on individual boilers, but it is more economical than the former method because a greater quantity of heating surface is in use with approximately the same amount of radiation loss. This method, however, cannot be employed in the early morning hours when there is a load of only 400 or 500 kilowatts on the station and a consumption in the city of approximately 9000 kilowatts, for it is not possible to keep sufficient boilers fired up to carry the higher load without making more steam than can be used at the extremely light loads.

Experiments show that the smallest quantity of oil that can be burned with an oil burner of the size in use at this plant is about 280 lb. per hr. If it is attempted to burn less than this the fire goes out. To insure good combustion and an even distribution of heat it is advisable to operate with not less than two burners, and consequently each boiler will generate over 200 horsepower if a fire is kept under it continuously. It is, therefore, essential to keep a number of boilers standing by with steam up but with the fires out, whenever the load on the station is very small in proportion to the load the station is expected to pick up in case of emergency.

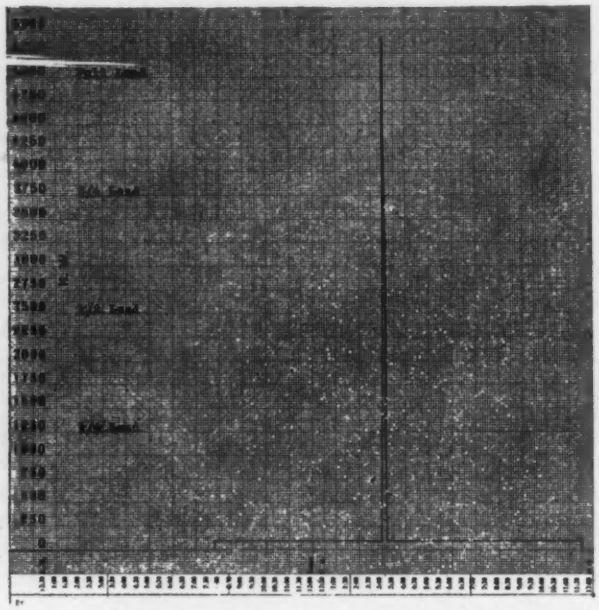
The Oakland plant normally operates nineteen hours per day with one turbine floating on the line, generating not over 100 or 200 kilowatts except during the peak in the evening when a load of approximately 6000 is carried. In case of any minor trouble on the transmission system this station instantaneously picks up a load of about 6500 kilowatts and if the difficulty continues, this may within two minutes increase to 12,000 kilowatts. The station may have to carry this load the rest of the day although in the majority of cases the trouble is immediately isolated from the rest of the system so that within two or three minutes the turbine can be switched back in parallel with the transmission system and the load dropped again to zero. There is no notice given of the load coming on, the only indication that the operators in the station have being the movement of the wattmeter needle and the steam gauge needle. This means that the wattmeter must be watched continuously so that the signal can be given to the firemen to light up their fires.

This station contains 12 boilers, eight McNaull, 750 h.p., in one fireroom and four Parker, 773 h.p., in the other. Ordinarily a light fire is carried under three boilers but in order to have all boilers hot and ready to generate steam quickly as soon as the fires are started, it is customary to fire the boilers alternately; that is, three boilers are kept under fire for three hours and then three other boilers are fired up and the fires under the first three are put out. This rotation is continued throughout the day.

As soon as the whistle blows signaling that a short circuit has occurred, all boilers except those down for cleaning or repairs, are fired up. By careful training of the men in prompt action the entire operation of opening the dampers and ash pit doors, light-



Station C, Oakland. Dec. 2, 1914.



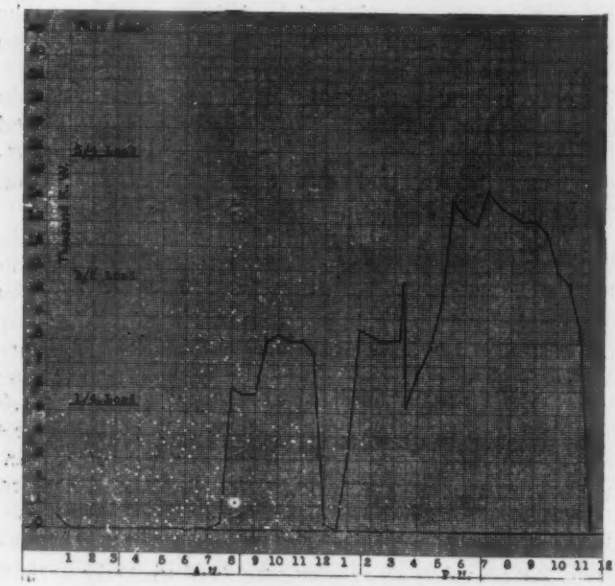
Station B, Sacramento. Dec. 2, 1914.

ing burners from a torch and adjusting the oil and steam valves at the burners of all boilers is accomplished in less than one minute. During this time the steam pressure often drops 10 or 15 pounds but unless an unusually heavy load is picked up, this pressure can be recovered within five minutes.

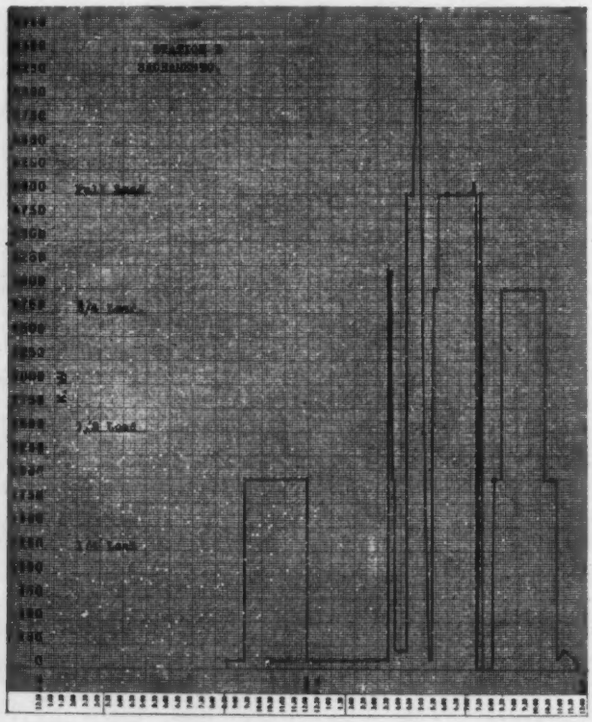
It must be borne in mind that when a disturbance on the transmission line occurs no one in the station knows whether the difficulty will last a minute or an hour, and it is therefore necessary to get all the boilers into commission at once so as to be prepared for a load of some duration. As a matter of fact, however, in the majority of cases the load remains on the station not over three or four minutes, and as soon as it goes off the fires must be put out and the dampers shut, and in many cases the safety valves blow. Tests have shown that under conditions such as described, lasting three minutes from the time the signal to light the fires is given until the fires are put out, one boiler uses 63 pounds of oil. This is equivalent to 630 pounds or nearly two barrels if ten boilers are lighted up.

The station at Sacramento is used as a stand-by station in the same manner as the Oakland station except that when a short circuit occurs the load picked up is often nearly the full capacity of the plant. In other words, the load on this plant frequently jumps from zero to full load instantly. This plant, which contains one 5000 kw. turbine, is operated by four boilers of 823 horsepower each, one of which is kept cut out for cleaning. The other three boilers are kept cut in on the line and are fired alternately so as to be kept hot.

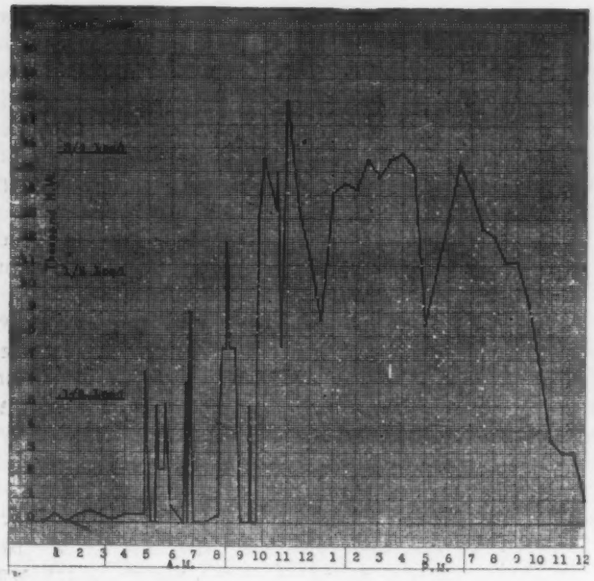
A true idea of the conditions of operation at the



Station C, Oakland. Nov. 27, 1914.



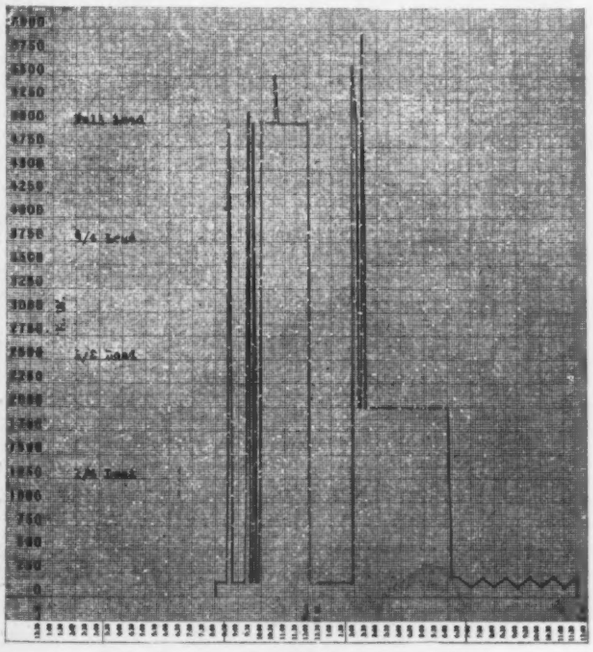
Station B, Sacramento. Nov. 27, 1914.



Station C, Oakland. Feb. 8, 1915.

Oakland and Sacramento plants can best be obtained from a study of the load curves of the two plants. The accompanying load curves illustrate these conditions. The load curve for the Oakland plant for December 2, 1914, shows about a normal load for this station. The turbine started up at 6 o'clock in the morning, ran along with little or no load until at 3 o'clock a short circuit occurred which, however, lasted only a few minutes. This was the only disturbance during the day, the load dropping to zero again and remaining very small except during the evening hours. The load curve for the Sacramento plant on the same day shows no appreciable load except at 3 o'clock when the same disturbance was felt at this plant. The disturbance appears more marked at Sacramento owing to the fact that the load picked up was greater in proportion to the size of the plant.

The load curves of these two plants for November 27, 1914, and February 8, 1915, illustrate the conditions of operation during unusually stormy weather when a great many disturbances occur on the transmission lines.



Station B, Sacramento. Feb. 8, 1915.

In view of the unusual conditions of operation at these two plants a brief reference to some of the elements entering into the cost of operation will be of interest.

To determine the amount of fuel oil required to keep a boiler hot and ready for this stand-by service, tests were made on one McNaull and one Parker boiler at the Oakland plant. In each case the boiler was warmed up slowly with a light fire; then the fire was put out, the stop valve was shut and the boiler was allowed to stand. At the end of each hour the boiler was fired for a few minutes, long enough to bring the steam pressure back to its original pressure. The oil burned each hour was weighed and the drop in pressure noted. The following are the results:

	750-h.p. McNaull Boiler			773-h.p. Parker Boiler		
	Steam Pressure lbs. per sq. in.		Oil Used lbs.	Steam Pressure lbs. per sq. in.		Oil Used lbs.
	Original.	Final.		Original.	Final.	
1st Hour	188	177	32	186	190	0
2d "	188	172	43	190	183	4
3d "	188	169½	53	186	169	25
4th "	188	171	48	186	166	23
5th "	188	168	53	186	166	26
Average of last three hours			51.3			24.6

The last three hours show fairly constant conditions in each case and their average may be taken as representative of the amount of fuel required to maintain steam pressure at over 160 pounds in the boiler, and to maintain the brickwork at a constant temperature. The figures are 51.3 lb. per hour for the McNaull and 24.6 lb. per hour for the Parker boilers, amounting to 3 and 1.4 per cent respectively of the quantity of oil required to operate the boiler at its rated capacity. These figures compare very favorably with the figures given by Mr. Hunter for the Ashley Street station in St. Louis, published in the last report of the Committee on Prime Movers, namely 130 lb. of coal per hr. to maintain steam at 60 lb. in a boiler having 100 sq. ft. of grate surface.

The marked difference between the Parker boiler and the McNaull boiler is due to the fact that while no pains were taken on the McNaull boiler to prevent leakage past the dampers, the Parker boiler is fitted with a damper that can be shut tight. This difference is borne out in the following two tests giving the amount of oil required to raise steam pressure in the boilers after the fires had been out for several hours.

	McNaull Boiler. 750-hp.	Parker Boiler. 773-h.p.
(1) Boiler without fire for 7 hours before being cut off the line—then cut off the line and allowed to stand 8 hours—then fired up and brought back to line pressure. Oil used—lbs.	514	260
(2) Boiler under fire for 3 hours with light fire—then fires put out and boiler immediately cut off the line and allowed to stand for 7 hours—then fired up and brought back to pressure. Oil used—lbs.....	336	81

The damper is a detail of boiler construction that is often neglected. While it is not of great importance in a plant that is operated continuously, in a stand-by plant the tightness of the damper becomes of very great importance, and this is especially true in the case of oil fuel where the damper can be shut as soon as the fire is put out.

[To be continued.]

ELECTRIC LINE DISTRIBUTION CONDITIONS IN THE PACIFIC NORTHWEST.

BY J. C. MARTIN.

(As a preliminary to giving reasons for changes in the N. E. L. A. specifications for line construction, some peculiar conditions on the Pacific Coast are described in detail. This paper was presented at the San Francisco convention of the National Electric Light Association, June 7-11, 1915.—The Editor.)

During the last two or three years there has been a growing controversy as to what constitutes proper specifications under which line construction shall be carried on. The move toward standardization has been constantly gaining force in all industries and, naturally, has included the electrical industry. The movement toward specific public regulation of the activities of public utilities has been one of vital interest to the electrical industries. Where these movements through the use of the National Electric Light Association Specifications have touched the question of line construction, we contend that the form they have taken has been an embarrassment to us in the Pacific Northwestern States. This paper is an endeavor to set forth a few of the reasons why this embarrassment exists.

There are several factors that must be considered. The more important ones are:

(1) The contrast between conditions in the eastern and western sections of the United States.

(2) Distribution line conditions and voltages in the East and West.

(3) The intended application of the specifications as contrasted with the attempted application of them.

(4) Features of the specifications which have embarrassed the Western states.

Contrast Between Eastern and Western Conditions.

In using the words "eastern" and "western" it is intended that the word "eastern" shall refer particularly to conditions as existing east of the Mississippi River, and the word "western," as referring to conditions in the Pacific Northwestern States of Idaho, Montana, Oregon and Washington, which form the Northwest Electric Light & Power Association territory.

The early settlement of the Atlantic States naturally resulted in an early development of their natural resources. The comparatively short distances and the accessibility of the Middle Western states from the Atlantic states brought about their early settlement. As a result, the Eastern states reached an advanced stage of development before the beginning of the present century.

The real commercial development of the electrical industry in the United States or for that matter in the entire world, may, for all practical purposes, be assumed as having started between the years 1880 and 1890 and the rate of development as has accelerated rapidly since 1890. The days of the pioneer in the Eastern states were long passed when the industry gained its permanent foothold and made itself felt in the commercial life of the country. Agricultural and manufacturing industries were, as a whole, far beyond the initial development stage. Cities and towns were already supported by well developed rural districts. Mining and manufacturing industries were developed and meeting the demands of the states for raw materials and manufactured products. The electrical industry had before it, in these states, a field in which numerous industries were already developed and its task consisted in proving to these industries that its product could be employed to effect substantial economies in, and further develop, their numerous processes. The industries themselves were not in the experimental stage and struggling for a foothold, but had their assured markets and were growing and prosperous. If the electrical industry could prove its worth, the market for its product was assured and its rate of growth would be limited only by its ability to develop apparatus and methods necessary to meet the demands.

The situation in the Western states is widely different. Cut off from the rest of the country by forbidding mountain chains and originally considered a desert, the territory was not fully explored until after the eastern portion of the United States was beyond the initial development stage. When explored and its possibilities realized, rapid development was prevented by climatic conditions and lack of transportation facilities. In the region between the Rocky and Cascade mountain ranges development has been extremely slow. As a result, the Western states are, as a whole, not yet out of their initial development stage and few if any of their industries have passed this stage. A study of Tables I and II will serve to bring out the force of the statement that the Western states are passing through the earlier stages of development at a much later date than the Eastern states. The data are taken from the Abstract of the Thirteenth (1910) Census of the United States, page 29. Table I is based on the grouping of states used by the Census Bureau. The states of Idaho, Montana, Oregon and Washington are included in the "Mountain" and "Pacific" groups, which, it will be noted, have the smallest average population per square mile of any of the groups and the greatest percentage of increase between 1890 and 1910. If the population per square mile basis furnishes any ground for estimating the comparative state of development, these two groups of states are yet far behind the other sections.

Table I.

United States Population Statistics.

Division and State.	Population 1910.	Land Area sq. mi. 1910.	Population per Sq. Mile. 1910.	1890.	Increase.	%
New England	6,552,681	61,976	105.7	75.8	29.9	39.5
Middle Atlantic	19,315,892	100,000	193.2	127.1	66.1	52.0
East North Central.	18,250,621	245,564	74.3	54.9	19.4	35.4
West North Central.	11,637,921	510,804	22.8	17.5	5.3	30.3
South Atlantic	12,194,895	269,071	45.3	32.9	12.4	37.7
East South Central.	8,409,901	179,509	46.8	35.8	11.0	30.7
West South Central.	8,784,534	429,746	20.4	11.0	9.4	85.5
Mountain	2,633,517	859,125	3.1	1.4	1.7	121.4
Pacific	4,192,304	318,095	13.2	5.9	7.3	124.0

In order to show more clearly the condition in the states covered by the Northwest Electric Light & Power Association, Table II is presented. This, with one exception, shows a higher percentage of growth for each individual state than the average shown in either the "Mountain" or "Pacific" groups and the average population per square mile for each state is, with five exceptions in 1910 and three exceptions in 1890, far less than that of any of the states in groups other than the "Mountain" and "Pacific."

Table II.

Population Statistics of States in Northwest Electric Light & Power Association Territory.

State.	Area sq. mi. 1910.	Population. 1910.	Population. 1890.	Pop. per sq. mi. 1910.	Pop. per sq. mi. 1890.	Increase.	Increase Per cent
Idaho	83,354	325,594	88,548	3.9	1.1	2.8	254
Montana	146,201	376,053	142,924	2.6	1.0	1.6	160
Oregon	95,607	672,765	317,704	7.0	3.3	3.7	112
Washington..	66,836	1,141,990	357,232	17.1	5.3	11.8	213
Totals	391,998	2,516,402	906,408	6.4	2.3	4.1	178

The development that has taken place in the agricultural sections is largely confined to the valleys where the rainfall is sufficient to permit the growth of grain, notably wheat, and other farm products, and to those portions of the territory where a few courageous pioneers have undertaken to solve the irrigation problem.

The agricultural possibilities of this section are only being discovered and, unlike the Eastern states, this industry is just starting to develop. Because of climatic conditions it must depend on the electrical industry to a great extent for the necessary water supply. The other natural resources have scarcely been touched and the industries of which they form the basis are only in their infancy. As a consequence the electrical industry in this section has a handicap that is not felt in the Eastern states in that it must solve its problems of initial development at the same time that the industries it aims to serve are working out their problems of initial development. The failure of either to meet a problem, then, means not only a direct loss to both, but exercises a retarding influence on the development of the whole territory.

The efforts of the electrical industry in the Eastern states were originally largely confined to the development of business in the cities and towns of its territory and only in the last few years has it begun to reach out into the rural districts. Naturally, the first efforts are directed toward extending lines into the most populous rural sections and the industry is directing these efforts from a well established base in the cities and towns to which such rural districts are tributary. The customers are those on the developed and well established farms and such experimental work as is attempted is carried on under the most favorable circumstances. In the event of failure to solve any particular problem, the failure of the customer's agricultural operations is not involved. He fails to secure an easier or more economical method of carrying on some particular operation and the company fails to develop a particular class of business, but does not lose a class of business that may mean the difference between profit and loss in its total operations.

The conditions in much of the territory of the Western states are the reverse. With the exception of those depending on the lumber and mining industries, such cities and towns as have been developed are located where climatic conditions or irrigation development have permitted agricultural pursuits. The further development of the agricultural territory depends on the ability of its people to secure the necssary water supply to further develop their agricultural industries. Some of this necessary water supply will undoubtedly be secured from gravity canals, but the larger portion of it must be secured by pumping, and we who are engaged in the development of the electrical industry in the Western states are facing the problem of meeting the demand for a large part of the necessary power. If we fail to solve the problem, it means a distinct setback to the territory in the Northwest and a loss to the country as a whole.

Some one is sure to ask why so much depends on the development of the electrical industry. One important reason is the inadequate fuel supply of the Western states as compared with that of the Eastern states and the much higher fuel costs. Where the industries of the Eastern states, in their initial development, have depended for their fuel and therefore their power supply on the cheap fuel resources of their territory, the Western states must depend upon their water power resources for their power supply. The full utilization of these water power resources, because of the distances over which power must be transmitted, is possible only through the agency of the electrical industry. Unfavorable conditions of first cost, transportation facilities, operating attendance and high or prohibitive rates of interest on outside capital, which must be employed because of the lack of the local capital that has been so important a factor in the development of the isolated plants of the Eastern states, are important items that should be considered in the development of these resources. These factors produce conditions that frequently make it necessary that the power service, if it is to be rendered at all, be rendered by the larger transmission companies. Power consuming industries in these districts, because of the handicap imposed on the smaller developments, are far less able than similar industries in the Eastern states to develop their own power service. Therefore, in many cases the existence of these industries depends on the ability of others to furnish the power supply and assume that part of the financial burden.

Emphasis has first been laid on the agricultural development of the country because it is one of the big problems to be faced and may be considered the basic problem. Failure to properly develop the agricultural industries would be a calamity to the whole territory.

It must not be supposed that the same arguments do not apply to other industries. The mining industries, the small manufacturing plants as well as the large ones, and all industries requiring power are equally dependent on the development of the electrical industry. Failure on the part of the electrical industry to solve its problems means not merely a failure to find an easier and less expensive way to carry out individual manufacturing or agricultural operations or the securing of greater comfort and convenience, but it means lost industries or failure in lines of development that have a vital bearing on the development of the whole territory.

[To be continued.]

Japanese aniline dyes are being produced by the Tokyo Gas Company as a by-product from coal tar resulting from the manufacture of gas. It is likely that the government will grant a ten-year 20 per cent subsidy on coal-tar commodities, exempt the industry from taxation and provide free transportation of the products.

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Semi-Annual Index

The index to the volume which is completed with this issue has been printed and will be sent to those subscribers who request it. As every article which has been published during the past six months has been cross-indexed this makes an invaluable reference regarding the electrical developments of the West. In fact the indices of this journal during the past twenty years present an outline of the changes that have been made in power practice in that period and include the names, as authors, of the men who have made this history.

Personality in Business

Should the personality of the leaders of an organization be emphasized or submerged? Concerning this, there is great difference of opinion. Emphasis of personality has so frequently meant "playing to the grandstand" that business managers are prone to discountenance it. So much has been accomplished by team work that the present tendency seems to be to subordinate the individuality of the leaders. The greatest military organization that the world has known is based upon complete submergence of personality. As an example of effective preparedness, machine-like precision, the German army is without equal. Yet there are some men who point out this lack of individuality as being the vulnerable point, the heel of Achilles, in this system.

The same is true of many an American corporation, particularly those engaged in the public service. The full measure of effectiveness is not being gained from organizations which have been built up by the collective effort of men who have lost their identity in the corporate entity.

Every successful company has at its head a man of strong individuality, an individual who can get public support. Lack of public support is responsible for the failure of many enterprises and the man who can command such support can turn failure into success.

No man will fight for his boarding-house, nor can he sympathize with an impersonal organization which represents to him no more than a monthly bill for electric current, an inexplicable service measured by a mysterious instrument and supplied by an incomprehensible means. Confidence is wanting because of absence of personality,—"the quality or state of being a person and not a thing or abstraction."

But if John Smith personally knows the manager or other representative of the company, he is willing to take a chance on human nature, even if he does not understand electrical nature, and will consequently pay his bill cheerfully. He takes a deeper interest in the enterprise and lends his support in time of need.

It therefore would seem to behoove a public service corporation to develop the personalities of the units of which it is the aggregate. These personalities are the reflection of the personality of the leading executive. If his personality dominates and orients theirs, even as the molecules of an iron bar are influenced by magnetic force, then is the organization effective and capable of dominating and influencing the minds of the public it serves.

So instead of subordinating personality it should be co-ordinated. Personality needs an organization that its field of influence may be extended and the organization needs personality so that its work may be effective.

The executive's personality gives to a corporation its spirit. It is the corporation soul. If the leading personality is a man of narrow view the corporate policy is narrow. The converse is equally true. The individuality of the prime mover cannot be completely concealed behind the impersonal mask of the corporation. Then why attempt to conceal it? It is a fundamental axiom of advertising to emphasize the personality of the man who is doing things rather than the things that are being done, in order to attract favorable public attention. The man at the head of an electric light and power company during these troublesome times who can get the sympathy and therefore the support of the people is the only kind of a man who can safely pilot the organization.

Advance in Steam Generation

The past several months have witnessed noteworthy advances in steam power plant economy. Indeed to such an extent have improvements in method of operation and low cost of apparatus advanced during this recent period that increased competition between steam and water power developments is observed on all sides. The rapid development of moderate and even long distance transmission systems radiating from steam plants is convincing proof of these changed conditions.

This advance is due to several factors. The foremost of these factors, so far as Western conditions are concerned, is the cheap and abundant supply of fuel oil that seems to be more and more available in ever increasing quantities. Invention in design and skill in engineering operation are, however, contributing their full quota in effecting those remarkable results in economy.

The discovery of the harmful effects of soda ash upon boiler tubes and its effective prevention has greatly lengthened the life of the boiler. This has been materially aided by preheating the feed water to drive out the air, a common cause of pitting.

Improvements in condenser apparatus whereby a saving in a half-inch of vacuum is accomplished by effecting lessened friction in the passage of the steam through the condenser, has brought about the production of lower hot well temperatures which have made possible a surprisingly increased saving that may be accomplished by the installation of economizers.

Another economic factor, truly unique, has made its appearance during the year in the growing use of motor-driven auxiliaries in the steam power plant. Not only are these installations in themselves proving of economic value but they have still another interrelated bearing upon the saving in the cost of steam production. Since electricity is now in a large measure the propelling force for the auxiliary apparatus, the amount of steam formerly utilized in the operation of the steam auxiliaries is materially lessened, the exhaust steam from the auxiliaries is of course utilized in feed water heating. It follows then that the feed water temperatures are lower than formerly. This of course effects an increased useful function for economizer installation.

An Evil in Over-Standardization

The recent convention of the National Electric Light Association has aptly been called the "standardization" meeting. The revised Meterman's Handbook, the switchboard manual, the proposed high tension manual, the code on terminology, the manual on accident prevention, the manual on underground construction—all emphasize standardization. On the whole, the movement toward standardization is well taken. Uniformity in design and practice aid materially in producing efficient and economic results. In certain instances, however, over-standardization on the part of the association has materially embarrassed some of the member companies in certain localities. In any standardization of practice the specifications should not go too far into fixed details of construction. For thereby the details applicable to one situation may not be applicable to all situations.

A peculiar instance of this has arisen in Western localities during the past three years in connection with specifications for crossings over railways and public highways. Since certain conditions present themselves in the West that do not appear in Eastern localities, these specifications proved absolutely inadequate and inapplicable. This was especially true in California, where it proved difficult to convince those making complaints before the California Railroad Commission that the specifications drawn up by the mother association could not be reasonably applied. In the Northwestern States the same status prevailed and the member companies had much difficulty in showing that various grades of construction are necessary to meet various conditions.

One instance of the burden now placed upon Western operators is the fact that the present rules require the same construction at all crossings whether the crossing in question be over a road used by a team once a month or whether it is over a thronged thoroughfare of a busy city. Numerous other instances may easily be cited.

Meanwhile several public service commissions adopted these standard specifications as authoritative expression of approved practice. Western power companies particularly, had difficulty in convincing the regulatory bodies that their peculiar conditions made compliance impracticable. The most embarrassing requirement was with regard to the construction of line crossings in sparsely settled communities, the specifications requiring the same standards as in thickly settled towns.

These facts were clearly presented at the San Francisco convention of the National Electric Light Association, where it was agreed that seperate committees should be appointed to deal with Eastern and Western distribution line conditions. This concession averted what promised to be a serious dissension. Future recommendations of the Overhead Line Construction Committee will eliminate many of the disputed points and the danger of over-standardization will thus be obviated.

PERSONALS

M. C. Turpin, of the Westinghouse department of publicity, East Pittsburgh, is at San Francisco.

G. A. Hughes, president of the Hughes Electric Heating Company, Chicago, was a recent Seattle visitor.

H. C. Goldrick, of the Western Electric Company, San Francisco, returned this week after an extended Alaskan trip.

Albert Casper, manager of the Vallejo Light & Power Company, Vallejo, Cal., left for New York the first of the week.

A. A. Brown, of the New York office Westinghouse Electric & Manufacturing Company, is a recent arrival at San Francisco.

H. H. Daley, of the sales force Westinghouse Lamp Company, San Francisco, has returned from a trip through Central California.

Chas. Robbins, assistant sales manager of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, is at San Francisco.

J. H. Kelly, assistant treasurer of the Seattle branch of the Western Electric Company, has returned from an extended business trip to Portland.

W. M. Hamilton, superintendent for the Portland Railway, Light & Power Company at Salem, Ore., has been elected president of the Salem Commercial Club.

Chas. F. Scott, professor of electrical engineering at Yale, and a member of the consulting staff of the Westinghouse Electric & Manufacturing Company, is at San Francisco.

J. J. Gibson, manager of the detail and supply department Westinghouse Electric & Manufacturing Company, East Pittsburgh, left San Francisco for Seattle the first of the week.

A. C. McMicken, new business manager for the Portland Railway, Light & Power Company, was at San Francisco during the past week before attending the jobbers' meeting in Yosemite.

E. P. Dillon, of the railway lighting department of the Westinghouse Electric & Manufacturing Company, who has been in San Francisco for several days, left for Seattle the first of the week.

H. E. Sanderson, Pacific Coast manager Bryant Electric Company, is making a brief Eastern trip, expecting to return before the convention of the National Electrical Contractors' Association in July.

M. A. Curran, general credit manager of the Western Electric Company, New York, was in attendance at the convention of the National Credit Men's Association, Salt Lake City, Utah, last week.

Dr. S. W. Stratton, chief of the United States Bureau of Standards, Washington, D. C., delivered an illustrated lecture on the work of the bureau in Scottish Rite Hall, Los Angeles, on June 16, to a large and appreciative audience.

Shiro Takano, electrical engineer of the department of communications of the Imperial Government of Japan, is a recent arrival at San Francisco, and will visit the various important electrical manufacturing centers in the United States.

John Curtin, manager of the industrial and power department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., who has been making a business visit at San Francisco, left the first of the week for the East, via Seattle.

C. L. Cory, professor of electrical engineering at the University of California, is attending the annual convention of the Society for the Promotion of Engineering Education at Iowa State College, Ames, Iowa, for which he has prepared a paper on "The Education of the Future Engineer." He will return to California about the first of July.

Leo J. Champagne, electrical engineer, Los Angeles county, Los Angeles, Cal.; **P. E. Chapman**, assistant to general superintendent electric distribution, Pacific Gas & Electric Company, San Francisco, Cal.; **A. A. Flynn**, electrical engineer, Rogue River Public Service Corporation, Gold Hill, Oregon; **A. H. Q. Phipps**, engineer in charge power house, B. C. Electric Railway Company, Goldstream, B. C.; **Dudley Sanford**, operator, Utah Power & Light Company, Grace, Idaho, and **James U. Smith**, head draftsman, Mechanical & Electrical Department, Panama-Pacific International Exposition, San Francisco, Cal., have been elected associate members of the American Institute of Electrical Engineers.

MEETING NOTICES.

Electrical Development and Jovian League of San Francisco.

As chairman of the day at the league meeting on June 16th Mr. Roscoe F. Oakes, president of the American Ever Ready Company, had provided a remarkable entertainment. The room was beautifully decorated with miniature lamps, each member was presented with a pocket flash lamp and a college quartet enlivened the meal with songs. Before the speaker of the day was introduced, Geo. B. Muldaur, manager of field co-operation for the Society of Electrical Development, told of the plans for the electrical prosperity week and announced the appointment of H. T. Matthews as Pacific Coast representative of the Society. Mr. Preston S. Millar past president of the Illuminating Engineering Society, and general manager of the Electrical Testing Laboratories, then gave a most interesting talk on "Illuminating Engineering." After defining his subject Mr. Miller stated that the development of the science of lighting during the last ten years might be divided into three periods. The first, or engineering period, was concerned with the design of proper reflecting glassware. The second, or physiological period, was devoted to the elimination of glare harmful to the eye. The latest, or physological period, has witnessed the development of artistic lighting and a study of the effect of lighting on the mind. At the conclusion of the largely attended and greatly enjoyed meeting a rising vote of thanks was extended to Mr. Oakes and Mr. Millar.

Oregon Society of Engineers.

The final meeting of the Oregon Society of Engineers before the summer vacation season, was held at the Public Library, Portland, Oregon, June 17th. The speaker of the evening was Clyde B. Aitchison of the Railroad Commission of Oregon, who spoke on the work of the commission. Mr. Aitchison reviewed in general the acts creating the commission and stated that in two years after the commission was given jurisdiction over public utilities—1912-1913—that more complaints were filed with it than in the previous six years of its existence. He also pointed out that the appropriation of the commission had been "cut" so low by the legislature that it was only possible to have a "skeleton" organization. The University of Oregon has conferred upon Mr. Aitchison the degree of Master of Arts for his thesis on "Decisions of the Railroad Commission of Oregon Under the Railroad Commision Act." Mr. Aitchison read several abstracts from this thesis and then reviewed three specific decisions of the commission, pointing out how the commission had made its "Cost of Service Analysis." He thinks the "cost of service" method of arriving at the "reasonableness" of a rate was gaining more favor in the eyes of commissions at the present time and that as accounting methods improved it would become more nearly the basis than any other method. He pointed out the pertinent part played by an engineer in all the "rate cases," as it was up to his judgment the "apportioning" of costs to various classifications such as "depreciation due to traffic" or "due to natural causes." Consequently the engineer could influence these cases very materially.

The Jovian Electrical League of Southern California.

It must have filled Reigning Jupiter Niesz's heart with joy and pride to witness the attendance and enthusiasm displayed at their weekly luncheon on June 16 by the Jovians of Los Angeles, who gathered to the number of 200 to pay their compliments to their national leader. Everything and everybody seemed to be at his best, and any one who knows Tribune Pieper can realize what a vast amount of "pep" that means when applied to that lively wire, who was welcomed back with a mighty cheer. It was a "fine" day for almost every one, and Santa Claus must have chuckled with glee to see his Christmas fund swell to vast proportions. R. H. Ballard, the newly elected vice-president of the N. E. L. A., received an ovation when entering the hall, and he responded in a most happy vein, by modestly referring to his own well-merited election, as a tribute to the electrical growth and initiative shown by the electrical men on the Pacific Coast. He emphasized the fact that the "Coast idea" of centralization of power in a few large plants and the development of systems of distribution, resulting in lower rates to the consumers, has finally received due resognition on the part of central station men throughout the country. He expressed the hope and wish that the 1918 convention of the N. E. L. A. be held in Los Angeles. S. W. Stratton, director of the U. S. Bureau of Standards, addressed those present on the true functions and policy of the bureau, giving a brief history of its development and his desire to keep in touch constantly with and aid those engaged in the practical end of the electrical industry. Letters were read from Bishop-elect Glass, Mayor-elect Sebastian, 1915 Committee Chairman Flint and Tribune Collins of San Francisco, which called for a defense from Big Chief "Al" Morphy regarding his absence from the recent ceremonies in the northern city. Neither he nor his friend, Murphy, however, could satisfy punctilious Tribune Pieper, and a fine was the inevitable result. Splendid musical selections were rendered by the Superba Theater talent, consisting of Mme. Budrow, soprano; Nancy Williams, contralto, and Marie Niven, soprano, with E. Burchler at the piano. Before Jupiter was introduced by the chairman of the day, Henry F. Holland, referred to as the next chairman of the league, Tribune Pieper narrowly escaped a fine by stating that the letters N. E. A. L. on the program, placed in that order, must have been intended for "Niesz 'ere at last." When he arose from his seat, Jupiter Homer E. Niesz was greeted with three rousing cheers and a tiger, and he at once ingratiated himself with the audience by saying that he, as Jupiter, felt quite at home in Los Angeles, for there, if anywhere, true Mt. Olympus must be located. He bestowed high praise on the progressive spirit of the West, the wonderful growth of Los Angeles and the vigor and enthusiasm displayed by the local Jovian League. He urged upon his hearers the necessity of taking a lively interest in civic problems and to become a power for good in the community. He referred to the benefits which the order is receiving through the activities of the commercial division, the selection of the 60 Jovian hotels, the employment department, the Jovian Bulletin, and the "efficiency wires" campaign. Every Jovian, he said, should try for the Vulcan degree in order to assist the commercial division, and make it possible to send out field representatives in the near future. He pleaded for enthusiasm, for it is that which wins success.

Joint Meeting of the Technical Societies of Southern California.

Actuated by a spirit of co-operation and the realization that many broad engineering problems, especially in so far as they have a direct bearing on the civic life of a community, can be and should be discussed to advantage by all the men to whom the public look for guidance along technical lines, resulted in the first joint meeting of all the technical societies having headquarters in Los Angeles being held in the form of a dinner at Hamburger's, on June 15. The societies participating were the Los Angeles Section of the American Society of Mechanical Engineers, Los Angeles Section of American Institute of Electrical Engineers, Los Angeles Section of American Institute of Mining Engineers, Southern California Section of the American Society of Civil Engineers, Engineers' and Architects' Association of Southern California, Southern California Section of the American Institute of Architects, and the Southern California Section of the American Chemical Society, seven societies in all. The chairman of the joint committee arranging the meeting was C. G. Pyle, and the secretary, Professor W. H. Adams. About 300 members of the various organizations partook of the dinner and listened attentively to the highly entertaining discussion of the topic, "Service of the Technical Man to the Community." Captain C. T. Leeds, of the Civil Engineers, was chairman, and the dean of the Los Angeles architects, Octavius Morgan, acted as toastmaster, and he made the significant announcement that at the next joint meeting, in September, Governor Goethals would in all probability be the speaker. Mr. Samuel Storrow, opening the discussion and holding aloft a hammer, told his audience that he intended to tell them some real truths, even though he may have to employ the tool which he held in his hand. He suggested, however, that we, as engineers, are destined to construct, not to tear down, to combine our technical knowledge with an understanding of law, finance and, above all, the minds of men. To have the courage of our convictions, to combine minds working along apparently divergent channels, so as to accomplish some great good, to take an interest in civic affairs and bring technical matters or technical errors to the attention of the proper authorities. Summing up these things, he gave this advice: 1. Educate yourself so as to see things in the light in which men of affairs see them, so as to make them financial as well as engineering successes. 2. Train the public to see things as you see them as technical men, and thus avoid errors. We are, in short, to be the trusted educators of a community. The next speaker was Wm. Mulholland, the builder of the Los Angeles aqueduct, who in a characteristically witty vein addressed himself largely to the younger element present and gave them much valuable advice, based largely on his extensive experience in public life. He sketched man's progress from prehistoric times, when he made tools for his own use and daily needs, to the mechanic, and later the engineer, pointing out that the former does things because they are obvious, while the engineer reasons out in advance the causes and effects of every act. Nature, he said, is a great engineer, and that while some of the forces are malign, while others are benign, the sum total of all the effects of nature's forces is for the common good of mankind. The public was referred to as "a good-natured slob," generally right in its estimate of men and fairly grateful. Smoothness, he stated, is worthy of cultivation, for the glad hand is one of the glories of humanity. Public service is universal service and private practice is less difficult, for then only the peculiarities and desires of one client have to be studied. The speaker expressed the belief that so-called efficiency methods might be carried to excess for the good of a service, illustrating his point by reference to his own department and the recital of several anecdotes. He believes, for example, in keeping old men, though apparently inefficient, but who have spent almost a liftime in the service of a city or firm. "It would," using his own words, "be inhuman to kick them out." He concluded his remarks by the statement that engineering talent must be born in one, and that many a man in his department without an engineering education has frequently shown marked engineering intuition.

A highly scholarly address was then delivered by Dr. James A. B. Scherer, president of Throop College of Tech-

nology, who fearlessly and eloquently went on to prove that the engineer has made but little progress since the time of the Egyptians in the design and construction of tools for the upbuilding of humanity, but that most progress has been made along the line of development of destructive weapons. He read a significant, but unpublished poem by Rudyard Kipling, entitled, "The Sons of Martha," dealing with the function of the engineer and his relation to mankind. From Shaw's "Man and Superman" he read the devil's estimate of the human race, a terrible indictment against modern so-called civilization. Dr. Scherer referred to the engineer as an idealist, and regretted the fact that in the United States the business of engineering has not as yet been raised to the dignity of a profession. He pleaded for less selfishness and more work for the masses who look to the engineer for guidance and inspiration.

Busch-Sulzer Diesel Engine Day.

Busch-Sulzer Diesel engine day was celebrated at the Panama-Pacific International Exposition Monday, June 21st. Over 500 invited guests were in attendance to enjoy a most delightful program, arranged by the western manager, Mr. W. S. Heger. G. W. Danforth, chief of the department of machinery, as chairman of the day, introduced the speakers, Chas. V. Vogelsang, representing the Exposition; Lieutenant Commander Woodward, representing the Navy, and Guy. C. Bayley, chief electrical and mechanical engineer of the Exposition. With a few patriotic remarks Mr. Vogelsang presented a bronze medal of honor to Mr. Heger as a slight token of appreciation of not only the magnificient exhibit, but its efficient management. As the medal of honor was being presented, the American flag was raised by a diminutive flower girl, and the great engine was set in motion by Mr. Heger's daughter and two maids of honor. The program was interspersed with music. A telegram from August A. Busch, of St. Louis, was read and the entertainment closed with an elaborate display of day fireworks.

ILLUMINATING ENGINEERING SOCIETY.

At the recent election of the Illuminating Engineering Society which closed May 25th, the following officers of the society were elected for terms beginning October 1, 1915: President, Dr. C. P. Steinmetz; General Secretary, Alten S. Miller; Treasurer, L. B. Marks; Vice-Presidents. Clarence L. Law and J. L. Minick; Directors, W. A. Durgin, M. Luckiesh and J. Arnold Norcross.

The proposals to amend the constitution of the society were also adopted by a vote of more than six to one. The principal amendments include provisions which create a grade of membership to be known as members. The requirements for admission to this grade, as at present set forth, are somewhat higher than those of the other grade of individual members known as associate members. The annual dues of members will be $10, and of associate members $5.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The Bay Cities Home Telephone Company has filed an application with the commission, requesting authority to transfer its franchise in the town of Emeryville, Alameda county, to the Pacific Telephone & Telegraph Company.

The commission has issued an order authorizing the Mt. Konocti Light & Power Company of Lake county, to issue $25,000 of capital stock on account of extensions made or to be made to its electric distributing system.

The Half Moon Bay Light & Power Company has filed an application with the commission, requesting authority to issue $6,156.26 of promissory notes to the French American Bank, of San Francisco.

The San Diego Consolidated Gas & Electric Company has filed an application with the commission, requesting authority to use the sum of $24,000 received as a premium on sale of stock for additions and betterments to its plant and system.

The Marin Water & Power Company has appealed to the Supreme Court in the matter of the commission's decision fixing the price to be paid by the Marin Municipal Water District for the power company's properties. This price was fixed by the commission in a decision rendered April 9, 1915, at $1,200,150 and was the result of a proceeding brought under Section 47 of the public utilities act, which provides that the railroad commission may determine the just compensation to be paid by any county, incorporated city or town, or municipal water district for the taking in eminent domain procedings of any public utility property and lands. The case just filed by the power company is the first appeal which has been made from any decision of the commission under this section of the act.

NEWS OF OREGON PUBLIC SERVICE COMMISSION.

Public utility officials have been notified by the public service commisison that under a law passed by the last legislature, every railroad and public utility must give immediate notice to the commission by telegraph or telephone, or personally when accidents occur on their premises in the state, and that if they fail to so report they are subject to a penalty. A detailed written report, under the law, is to be made to the State Industrial Accident Commission, and it is open to inspection by the Public Service Commission. An immediate report, however, must be made to the Public Service Commission in order that it may investigate if it so desires.

THE REFERENDUM IN WASHINGTON.

In Washington the 1915 legislature passed several measures which have now been held up by referendum petitions. These include the requirement that petitions for initiative and referendum and for recall should be signed at the place of registration, the anti-picketing bill and the requirement of a certificate of convenience and necessity before a public service corporation can enter a field already occupied.

NEWS OF IDAHO PUBLIC UTILITIES COMMISSION.

The commission has authorized and approved the flat rates proposed by the Great Shoshone and Twin Falls Water Power Company for the five pumping projects of the Twin Falls North Side Land & Water Company.

PUBLICATIONS RECEIVED.

A booklet has been issued by the Committee of Management, International Engineering Congress, 1915, containing information for members in the congress and for visitors who intend coming to the Pacific Coast at the time of the session of this congress. These booklets can be obtained upon request, by mailing a postal to Mr. W. A. Cattell, Secretary, International Engineering Congress, 417 Foxcroft Building, San Francisco, Cal., U. S. A.

"A Study of Boiler Losses," by A. P. Kratz, has been issued as Bulletin No. 78 of the Engineering Experiment Station of the University of Illinois. This bulletin presents a critical analysis of the data taken from a series of twenty-five trials made on a 500 horsepower Babcock and Wilcox boiler in the University heating plant. The heat balance has been subdivided so as to isolate and determine the amounts of the several losses chargeable to the boiler, furnace and setting. Complete forms for calculating a series of boiler trials are also given. Tests were made also upon some samples of weathered coal. No difficulty was experienced in burning this coal, but it was found that it had deteriorated during the weathering until it was about the same composition and grade as fresh Vermilion County screenings.

NEWS NOTES

FINANCIAL.

SACRAMENTO, CAL.—The Sacramento Gas Company meets August 16th to vote on an increase of the bonded indebtedness from $400,000 to $1,500,000.

TULARE, CAL.—The exact amount which the Mt. Whitney Power & Electric Company pays for the plant of the Tulare County Power Company is $615,000, of which $550,000 is cash. The indebtedness of the Tulare company is $335,000, and there will be $280,000 for the stockholders of the Tulare company.

LOS ANGELES, CAL.—An arrangement has been made whereby the city will use $390,000 of its sinking funds for the purchase of power bonds. The deal will enable the city to complete the power plant in San Francisquito Canyon and pursue the construction of the distributing system until the remainder of the $6,500,000 bond issue is sold.

SACRAMENTO, CAL.—E. S. Heller, O. K. Cushing and Frank Madison, who are working on a plan of re-organization for the Northern Electric presented their report this week. Their plan contemplates the issuance of three new securities, one for the holders of underlying securities of the Northern Electric, which shall bear interest at once, the second class is for securities for the overlying issue, and the third for creditors. Neither of the last two named will bear interest.

BOISE, IDAHO.—The Idaho Railway, Light & Power Company has been sold at public auction to the Electric Investment Company of New York, for $4,542,750. The sale was conducted by O. G. F. Markhus, special master, appointed by Judge Frank S. Dietrich, of the Federal District Court. The bid, the only one tendered, was made by W. J. Ferris, vice-president and general manager of the Electric Investment Company, and former receiver of the Idaho-Oregon Light & Power Company, who deposited with the master a certified check of $50,000, required under the court's order. The Electric Investment Company is the purchasing corporation for the National Securities Corporation, of New York, which is to be the temporary parent company of the five big hydro-electric power companies of Southern Idaho now being merged. It bid in and took over the property of the Idaho-Oregon Power & Light Company, also sold at public auction, under direction of the court, and this property, with the Idaho Railway, Light & Power Company.

SAN FRANCISCO, CAL.—Request for approval by the Railroad Commission of its new plan of financing has been made by the Oakland, Antioch & Eastern Railway Company. The plan embraces two agreements, one with the bondholders and the other with the stockholders of the company. The agreements provides that the bondholders shall deposit those coupons which will mature in the years 1915, 1916 and 1917. As security for these it is provided that the Oakland, Antioch & Eastern Railway shall deposit with the trustee prior to January 1, 1918, first mortgage bonds in an amount which, at 80 per cent of their face value, will equal the par value of the coupons deposited and unpaid on January 1, 1918. The stockholders' agreement provides that each subscriber thereto shall pay to the trustee, as a loan to the railway company, the sum of $3 on each share of stock held by him. These payments are to be made according to the following schedule: January 1, 1915, $1 per share; July 1, 1915, $1 per share; January 1, 1916, 50 cents per share, and July 1, 1916, 50 cents per share. As security for those advances the railway company agrees to deposit with the trustee its promissory notes in equal amount. These notes are to be secured by first mortgage bonds in the ratio of two to one.

SAN FRANCISCO, CAL.—The modified plan of reorganization of the United Light & Power Company, which has been agreed upon by all the parties, has been submitted to the railroad commission for approval. This plan differs from the one previously presented to the commission in the following particulars: The aggregate amount of the proposed bonded debt of the Consolidated Electric Company is reduced from $3,000,000 to $2,500,000; the face amount of the bonds to be delivered to E. W. Wilson in payment of the purchase price of the properties of the United Light & Power Company and its subsidiaries is reduced from $2,450,000 (less $243,000 face amount of underlying bonds) to $2,267,000 (less $243,000 face amount of underlying bonds); the proposal to issue $71,000 in bonds of the Consolidated company to the Great Western Power Company has been eliminated, the purchase price of $400,000 face amount bonds of the Consolidated company to be purchased by the Great Western company has been reduced from par to a net price of 85 per cent of par. Changes will also be made in the trust deed, so that the bonds will be in the denominations of $1000, $500, $250 and $100 instead of $1000 and $100, as previously provided. It is also proposed to omit from the pledged property the stock of the United Light & Power Company and the subsidiary companies.

ILLUMINATION.

LOS ANGELES, CAL.—The city council has fixed the gas rate at 64½ cents a thousand.

TEHACHAPI, CAL.—J. W. Finch & Company have offered to install the proposed lighting system at Tehachapi for $9000.

HOQUIAM, WASH.—Voters refused to grant an electric franchise to George H. Tilden of Seattle at a special election in this city.

LOYALTON, CAL.—The trustees are planning to submit the question to the electors of voting bonds for a municipal light plant.

ABERDEEN, WASH.—The council voted down the proposed power and light franchise of Geo. H. Tilden, bond broker, Seattle.

ALBION, IDAHO.—The council passed an ordinance granting the Washington Water Power Company a franchise to light the city with electricity.

ANACONDA, MONT.—A contract has been awarded to the Anaconda Copper Mining Company for electric lighting district improvement, at $5,795.29.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has offered to furnish light for all San Francisco public buildings at 3c a kilowatt hour.

MILWAUKIE, ORE.—The city council has granted a 25 year franchise to the Portland Gas & Coke Company to lay mains and furnish gas in Milwaukie.

MODESTO, CAL.—A contract for the installation of the Riverbank Lighting System was let to the Pacific Fire Extinguisher Company of San Francisco for $4185.

MILWAUKIE, ORE.—The council passed an ordinance granting the Portland Gas & Coke Company a 25 year franchise to lay water mains and furnish gas in Milwaukie.

RENTON, WASH.—A permit has been granted to F. Lane, manager of the Seattle Lighting Company, to lay 6 inch gas mains in certain designated streets and 2 inch in others.

CANYON CITY, ORE.—Work will probably start on the new light plant in Prairie City in a few weeks. It is understood that the machinery for the power house has been purchased.

BLACKFOOT, IDAHO.—The council will meet to consider the proposed new lighting system for the city submitted by Manager Hughes of the Southern Water Power Company.

DILLON, MONT.—The city of Dillon will install a modern lighting system, consisting of single and 3-globe column lights, in the near future. Work is to be in charge of Wm. E. Chapman, city engineer, Dillon

WALLACE, IDAHO.—The council has granted a franchise for a gas plant to John H. Wourms and associates. Actual work will be begun within six months. The plant is to be completed within one year.

PASADENA, CAL.—W. A. McNally & Company have been awarded a contract to install an ornamental lighting system on El Molino avenue from Fillmore to Woodland and on Alpine street and Pinehurst drive for $5950.

LOS ANGELES, CAL.—A movement is under way to extend the ornamental lighting system the entire length of Long Beach boulevard, from Los Angeles to Long Beach. The first unit of the system, reaching to Walnut Park, is completed.

WILLIAMS, CAL.—In the matter of street lights, a resolution was passed by the trustees calling for bids for the construction and maintenance of the system. The plans adopted by the board call for 34 lights, 22 being suspended over the center of streets.

DINUBA, CAL.—The Parlier Winery has applied for a franchise for a period of 50 years to lay gas pipes along the streets of the towns of Dinuba, Orosi and Cutler and other highways of Tulare county. Sealed bids will be received up to August 5th for the franchise.

EUGENE, ORE.—The city is considering the installation of a 1250 kw. steam-electric power plant as an auxiliary to the existing municipal plant of two 700 kw. generators on the McKenzie River. Plans, specifications and estimates are before the officials tentatively.

WALLACE, IDAHO.—The franchise permitting the construction of a gas plant in Wallace has been passed by the city council. The ordinance provides that work shall begin on the plant within six months and that within a year from that time the plant shall be in operation.

TRANSMISSION.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company has applied for an electric franchise for the southerly portion of King county. The hearing has been set for August 31.

VISALIA, CAL.—The Mt. Whitney Power & Electric Company is now preparing plans for the construction of a hydroelectric plant on the Kaweah River, which is estimated will cost, when fully completed, approximately $600,000.

SEATTLE, WASH.—The council has sent a request to the board of public works as to the best method to be used in sealing the Cedar River basin around the new dam and a motion passed requesting the board to make a reply to the council's former request.

NORTH BEND, ORE.—The council has instructed the city attorney to proceed with the necessary steps to acquire a water right on the Pony Inlet watershed. The council will later take steps to purchase 40 or more acres of ground in the vicinity for the construction of wells to pool the water.

BISHOP, CAL.—Preliminary work has begun on the new power plant at Silver Lake for the Pacific Power Company. The first work will be the construction of a wagon road to reach the place. There will be 2 or 3 miles of flow line to be built. The new power house will be at the small lake below Silver Lake.

RAINIER, ORE.—Rainier has been cut off from light and power by the breaking of the cable of the Oregon-Washington Corporation, which supplied it. A deep sea diver reported that the cable had been fused by water leaking in. The company has contracted for a new cable across the river at this point, and is planning to establish a temporary generator to supply the town during the five weeks which will be required to get the new cable installed.

TRANSPORTATION.

SOUTH SAN FRANCISCO, CAL.—The United Railroads has asked for an electric railroad franchise on the new Grand avenue extension.

ASTORIA, ORE.—The council has granted the Pacific Power & Light Company a franchise to lay its tracks on Franklin avenue from Hauke & Company's store to a point connecting with the line of the Astoria Box Company.

FRESNO, CAL.—Efforts are being made to finance the interurban line of the Fresno Interurban Company to Clovis. J. B. Rogers and O. O. Howard ask a guarantee of $25,000 from interested property owners, and Mahoney Bros., contractors, of San Francisco, will take $50,000 in bonds.

SEATTLE, WASH.—H. C. Henry has offered to finance the installation of electric escalators from Second to Fourth avenues on Seneca street. The estimated cost is $17,000. Henry's proposition is to charge the owners for the construction and operation in annual payments. If money is not pledged, the principal property owners will petition for an improvement district for the installation.

SACRAMENTO, CAL.—The city commission has decided to present a demand on the Pacific Gas & Electric Company for the $10,000 due the city for franchises abandoned several months ago. It was proposed to use the money to resurface J street from Front to Twelfth at the same time the street car company puts down heavier rails and re-paves its portion of the street. City Attorney Yell was instructed to inform the company the $10,000 must be forthcoming immediately or action will be brought to recover it.

TELEPHONE AND TELEGRAPH.

SEQUIN, WASH.—Joseph Keeler and others are interested in a company which is installing a telephone exchange in this town. Poles are being placed and wires strung.

GLENDIVE, MONT.—The Pioneer Telephone Company has elected C. A. Rasmussen as secretary-treasurer and manager. Additional extensions will be made during the ensuing autumn.

PHOENIX, ARIZ.—It is reported that the Postal Telegraph and Cable Company has definitely decided to reconstruct its line from Ash Fork to Phoenix, and to re-establish its office in the city.

SUSANVILLE, CAL.—The chamber of commerce of Ravendale is assisting with arrangements between the Dry Valley Telephone Company and the city by which the Dry Valley line will be given both long distance and local connection at Ravendale. The Dry Valley line is awaiting agreement before extending its lines into the town.

SPOKANE, WASH.—E. C. Hickman, division commercial superintendent of the Pacific Telephone & Telegraph Company, has announced that $580 will be expended to install a private branch switchboard for the Great Northern Company to replace the present board; $520 to install one section of a minor common battery switchboard in the Orchard office; $4580 for toll pole line, aerial wire construction, removals and repairs in Lewistown-Kamiah toll lead between Ilo and Kamiah, and $1080 for a toll pole line and aerial wire construction, repairs and underground cable across Medical Lake junction of Medical Lake toll lead.

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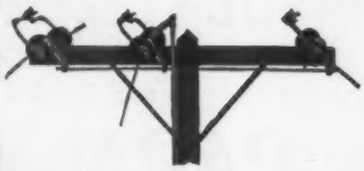

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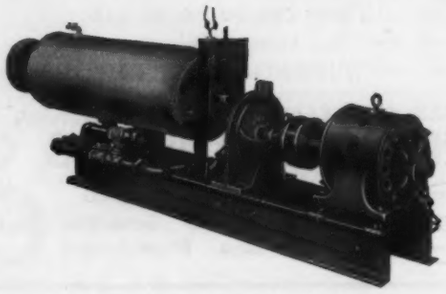

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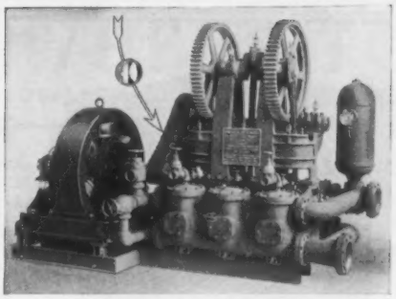

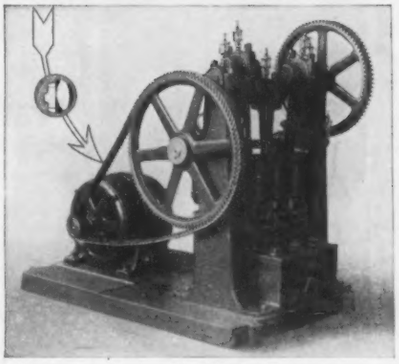

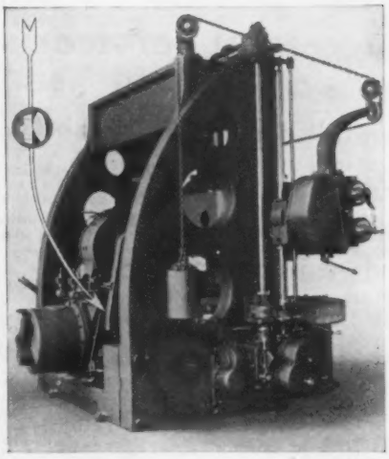

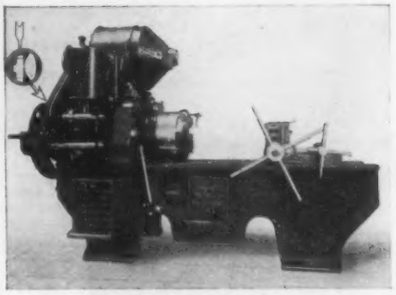

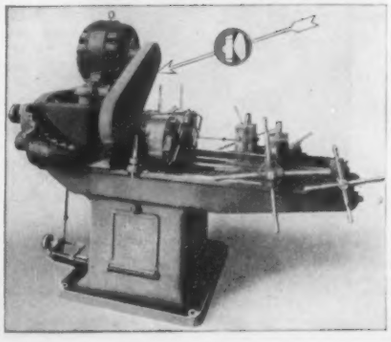

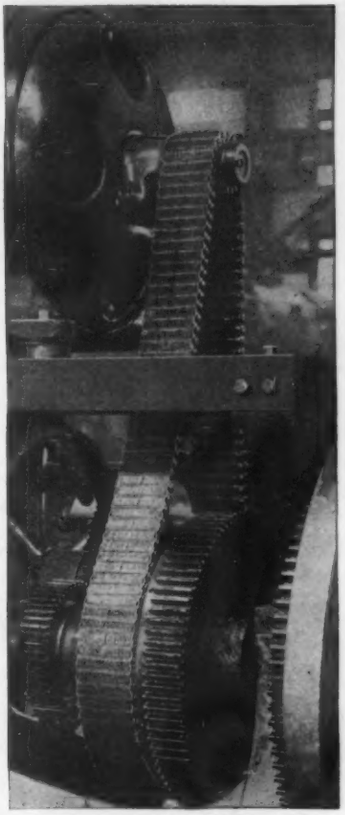

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Machine Tool Dept. B-59

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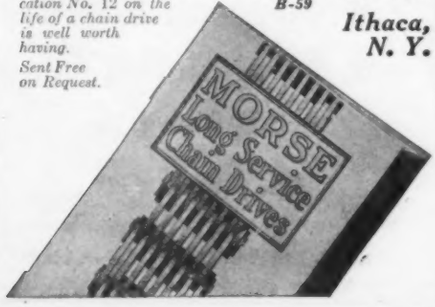

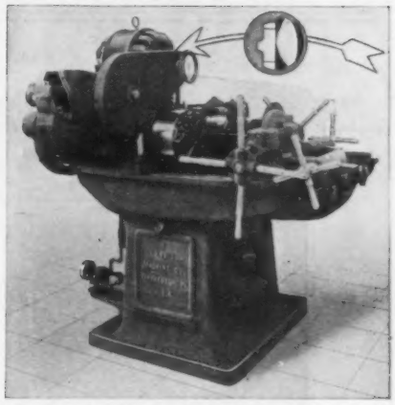

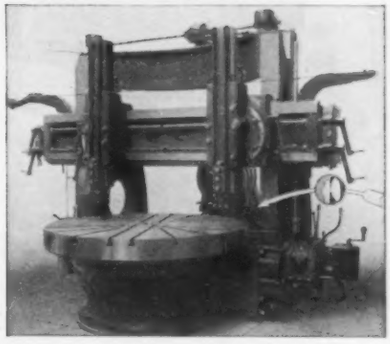

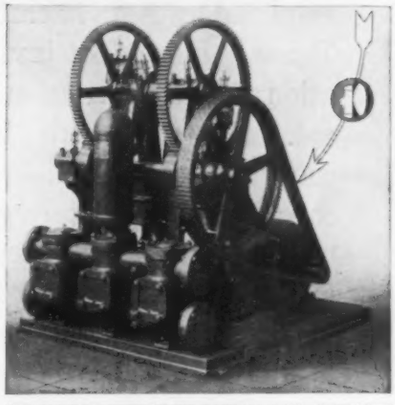

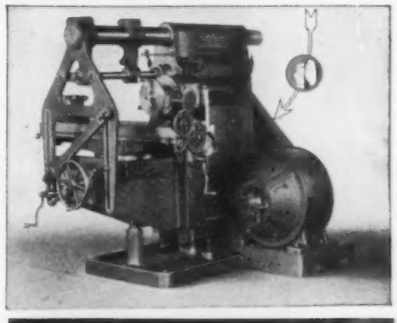

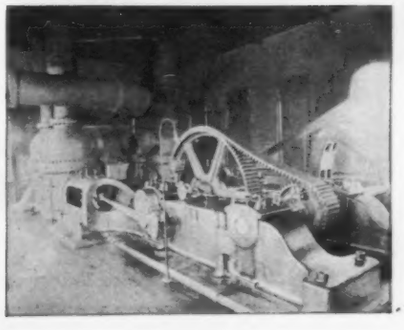

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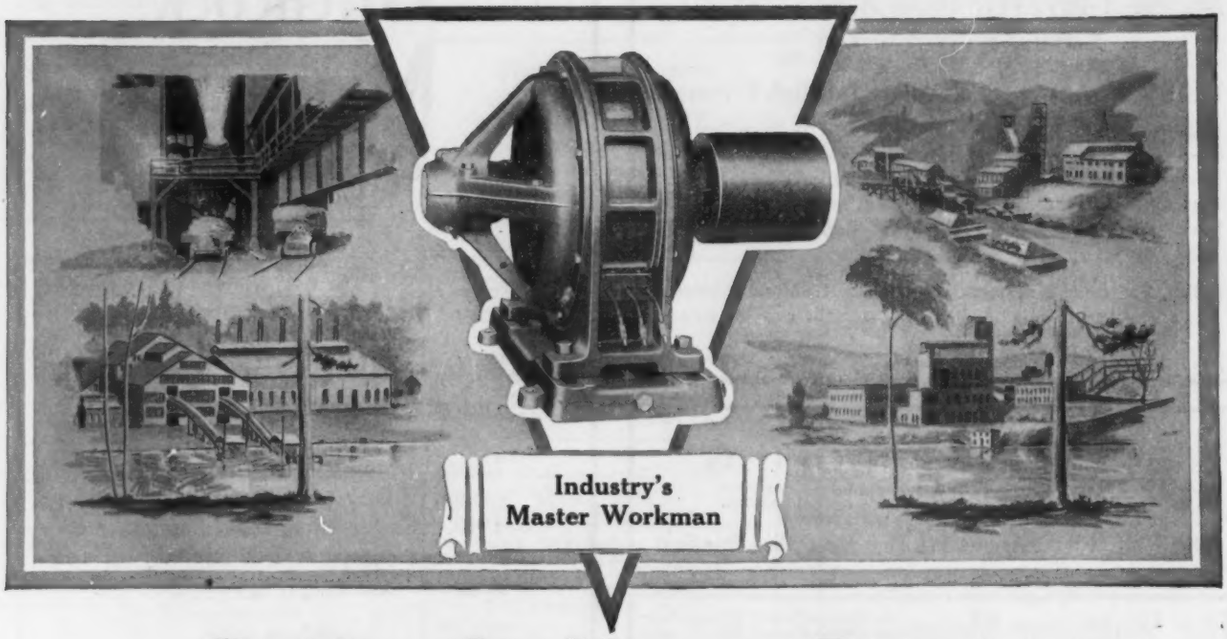

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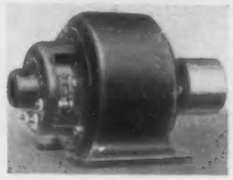

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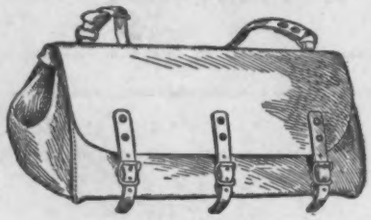

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